Bulletin of the Russian Academy of Sciences: Physics 2007 vol.71 N9, pages 1211-1215

Quantum interference effects of γ radiation under crossing-anticrossing of nuclear levels in an RF field

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Abstract

The quantum interference effects occurring in resonant scattering of a γ photon in the multilevel γ-optical medium 57Fe, affected by an external RF field, have been theoretically investigated. It is shown that a significant reconstruction of the hyperfine structure of nuclear states leads to the interference of partial forwardscattering amplitudes of a γ photon and, therefore, to a significant change in the nuclear refractive index of the γ-optical medium, depending on the amplitude, frequency, and phase of the external RF field. The conditions are found under which the effect of electromagnetically induced transparency can be observed in the technique of in-phase detection of γ photons. © Allerton Press, Inc. 2007.

http://dx.doi.org/10.3103/S1062873807090031